

"Scientific Motive" and "Practical Purpose" are very convincing. "Savoir c'est prévoir; prévoir c'est pourvoir." But there is no bowing in the house of utilitarianism, for the author takes such wonders of the modern world as wireless telegraphy, the telephone, the aeroplane, radium, antiseptics and antitoxins, spectrum analysis and X-rays, and shows most circumstantially that "each one of these things had its foundations in purely scientific work, and was not the result of deliberate intention to make something of service to humanity." In this connection we confess to being staggered by a remarkable quotation from the late Prof. W. K. Brooks; we like better one from Prof. A. N. Whitehead that "it is no paradox to say that in our most theoretical moods we may be nearest to our most practical applications."

In the very first volume of *NATURE* a strong plea was made on behalf of scientific discipline, and from time to time since powerful voices have urged upon the nation the imperativeness of paying more heed to the advancement and application of natural knowledge and to the cultivation of the scouting intelligence. Much has been done which it would be inaccurate and ungrateful to ignore, but still the people perish in thousands for lack of knowledge, and science, as Mr. Gregory says, is still too much the Cinderella in the house of education. It is valuable, therefore, that we should have in this book a judicial and factual statement showing not merely that natural science has given great gifts to mankind and put into our hands the keys to many doors, but that the mastery of some of its methods and the understanding of some of its principles are in themselves an educative discipline that cannot be attained in any other way whatsoever. We are glad that the author has gone a step further in insisting on the ethical value of learning to be a respecter of things and of habituating oneself to a high standard of accuracy.

In his references to the life and work of men like Galileo, Newton, Faraday, Darwin, Huxley, Kelvin, and Pasteur, the author illustrates the spirit of the discoverer—his fanaticism for the sanctity of truth, his disinterestedness and impersonal detachment, his delight in his work, and his cautious yet alert recognition of the possibility of error. As we read of the masters we feel a freshened conviction of the value of studies—far too rarely prosecuted—in the history of science. Much of the book is an eloquent commentary on the text: "The future of our civilisation depends upon the widening spread and deepening hold of the scientific habit of mind." And since the happiness of a people depends not a little on their capacity for the profitable enjoyment of leisure, we welcome the author's insistence on the inexhaustible delights of what our fathers called the pursuit of knowledge. It is man's prerogative to try to know Nature increasingly well, and it is certain that in proportion to his sincerity in this endeavour will be his enjoyment of her acquaintance.

Mr. Gregory has been well advised to dwell at
NO. 2439, VOL. 97]

considerable length on certain illustrations of the moods and methods of the discoverer, for the reader thus gets adequate concrete material on which to base an appreciation of his own. This greatly increases the value of the book. It has been quizzingly said that "the man of science appears to be the only man in the world who has something to say, and he is the only man who does not know how to say it." It is unnecessary to mention that Mr. Gregory, at any rate, must be exempted from this reproach, for his style is luminous and refreshing. We find, indeed, but one blemish in his work—that he does not tackle with sufficient directness the very interesting problem of the different kinds of discoverer, for there are certainly several distinct species which it would be profitable to have discriminated.

J. ARTHUR THOMSON.

MATHEMATICAL TEXT-BOOKS.

- (1) *Arithmetic*. Part i. By F. W. Dobbs and H. K. Marsden. Pp. xv+353. (London: G. Bell and Sons, Ltd., 1915.) Price 3s.
- (2) *First-year Mathematics for Secondary Schools*. By E. R. Breslich. Fourth edition. Pp. xxiv+344. (Chicago: The University of Chicago Press; London: Cambridge University Press, 1915.) Price 4s. net.
- (3) *Mathematics for Machinists*. By R. W. Burnham. Pp. viii+229. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1915.) Price 5s. 6d. net.
- (4) *A First Course of Geometry*. By Dr. C. Davison. Pp. 89. (Cambridge: At the University Press, 1915.) Price 1s. 6d.

(1) **T**HIS text-book consists chiefly of sets of examples and test-papers, with some typical solutions. Detailed explanations are left to each teacher to give as he thinks fit. This has the double advantage of keeping the book within reasonable compass and at the same time including as much as any boy is likely to require, for boys do not, and probably never will, read long discussions in the text. But when revising or doing out-of-school work a certain number of specimen solutions are of real use. We like the general appearance of the book; there are numerous interesting and attractive questions, those on contours and map-reading deserving special mention.

(2) The author has drawn up a continuous course of algebra, geometry, and very simple trigonometry, suitable for a first reading. He claims that the fusion of these subjects in a single volume increases the interest of the students, enriches the content of the teaching syllabus, and emphasises the relation between the different subjects. The geometry includes simple properties of parallelism, congruence, tangency, and similarity; the algebra goes up to factors and quadratic equations. The book is printed in a most attractive form, and there are a number of excellent portraits of famous mathematicians, with interesting historical notes attached.

(3) The author of this volume has had consider-

able experience in the training of mechanics, and he remarks on the surprising number of cases where their knowledge of mathematics is limited to the first four rules. This naturally leads to an unintelligent use of formulæ and a marked inability to make applications to practical problems as they arise. The plan of this book is designed to meet these cases. It starts with the use of fractions and decimals, and includes chapters on percentage, mensuration, constructions, trigonometry, and some of a more technical character on lathes, threads, machines, gears, and business organisation.

(4) This small book includes the principal theorems of the first three books of Euclid. It is intended to be used after the ordinary introductory graphical course, and aims at giving the reader a bird's-eye view of a subject to be covered in more detail at a second reading. Those who are familiar with Dr. Davison's larger work will recognise a similarity of treatment in these pages. It would be an improvement if answers to the numerical exercises were given.

APPRENTICE TRAINING.

The Principles of Apprentice Training, with Special Reference to the Engineering Industry.

By A. P. M. Fleming and J. G. Pearce. Pp. xiii + 202. (London: Longmans, Green and Co., 1916.) Price 3s. 6d. net.

MANY interesting opinions are expressed in this book, but the same thing is repeated too often under different headings. The authors give particulars of the mode of selecting and training apprentices which was begun in 1913 at the British Westinghouse Company's works at Manchester; all the lecturers are either engineers or foremen, and many of the former are graduates in engineering. Men so chosen are not always good teachers, though they may be excellent as practical men; so future lecturers are being trained from among the apprentices under the supervision of the authors. So far the scheme seems to promise success. In October, 1915, there were 309 apprentices out of a total of 1348 youths in the works; the number of apprenticed boys is increasing. The course, while thoroughly practical, makes reasonable demands on the pupils' intelligence.

On the general question the authors give details as to the present inadequate methods of preparing for work in life both "specialists"—by which term they indicate repetition workers using automatic or semi-automatic machinery—and craftsmen, who need wider experience, skill, and intelligence. They point out that in the elementary schools book-learning is predominant; they show how inadequate is the time spent in manual training and other forms of "doing." They indicate that in the secondary schools most of the pupils are trained as though their main object in life was to pass the entrance examination to a university—although the percentage of such children who become undergraduates is small.

All this is but too true, and there is little likelihood that it will be changed so long as practically all the higher officers in the Board of Education and in the Civil Service generally are selected from those who have had a literary training. For science, modern languages, and manual work are regarded as forms of improper educational "specialisation," and Latin and Greek as the sole means for developing the character and intelligence of British youth; and this although our naval officers, whose characters and intelligence most of us admire, are trained by means of mathematics and science, and have been deprived of the supposed indispensable benefits of classical training.

J. W.

OUR BOOKSHELF.

A Bibliography of British Ornithology, from the Earliest Times to the End of 1912. By W. H. Mullens and H. Kirke Swann. Part i. Pp. 112. (London: Macmillan and Co., Ltd., 1916.) Price 6s. net.

WE have not hitherto had an adequate bibliography of British ornithology, for the one by Elliott Coues begun thirty-six years ago was never, we believe, completed, and, excellent as was the first instalment so far as it went, it is, of course, now out of date. The bibliography upon which Major Mullens (who has already done work which may be considered as the basis of the present book) and Mr. Swann have embarked is of an ambitious and comprehensive nature. The aim of the authors has been to give a biographical account of each author of a separately-published work, followed by a bibliography of their works and of their papers contributed to journals bearing on British ornithology. Collations are given and spaced titles of books published before 1850; critical notes also on many books are included.

The first part of the book (of which there are to be six) has now been issued, and fully comes up to the promise of the prospectus. Even in this one part we meet with many books and authors with which few book-loving birdmen were probably previously acquainted. Under the heading "Anonymous" alone there are more than eighty items, and the present biographers have been very successful in hunting down the authors of these. The biographical notices are sufficiently full and, especially in the case of the older writers, very interesting. In fact, the book promises to be not only a very useful work of reference for British ornithologists, but also, what at first sight we might not expect, a very readable and entertaining book. It is well printed on very good paper.

An Elementary Manual of Radiotelegraphy and Radiotelephony for Students and Operators. By Prof. J. A. Fleming. Third edition. Pp. xiv + 360. (London: Longmans, Green and Co., 1916.) Price 7s. 6d. net.

It is unnecessary to do more than refer very briefly to the third edition of Prof. Fleming's